

CLAIMS

1. A method for preparing an amorphous metal fluoride of the formula  $M^{x+}F_{x-\delta}$  comprising the steps of

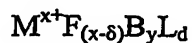
- a) providing a precursor, whereby the precursor comprises a structure having a formula of  $M^{x+}F_{(x-\delta)-y}B_y$ ; and
- b) reacting the precursor with a fluorinating agent generating the amorphous metal fluoride having a formula of  $M^{x+}F_{x-\delta}$ ,

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,  
 B is a coordinately bound group;  
 x is any integer of 2 or 3;  
 y is any integer between 1 and 3;  
 $\delta$  is 0 to 0.1; and  
 $x-\delta > y$ .

2. The method according to claim 1, wherein B is selected from the group comprising alkoxides, enolates and salts of carboxylic acid having preferably a length of 1 to 5 C atoms.

3. The method according to any of claims 1 to 2, wherein the precursor, the starting material for the precursor or the fluorinating agent is present in or introduced into an anhydrous organic solvent, whereby the anhydrous organic solvent is preferably selected from the group comprising alcohols, ethers, ketones, alkanes, formic acid, acidic acid and propionic acid.

4. The method according to any of claims 1 to 3, wherein the precursor contains or is made from a compound of the formula



whereby M, F, x, y,  $\delta$  and B are defined as in any of the preceding claims;

L is a solvent, preferably a solvent as specified in claim 3; and  
d is  $\leq 1$ .

5. The method according to any claims 1 to 4, wherein step b is carried out at a temperature below the crystallisation point of the amorphous metal fluoride.

6. The method according to any of claims 1 to 5, wherein the precursor is prepared by

- providing the metal component of the precursor as an anhydrous metal compound, preferably as  $M^{x+}B_x$ ,

with M, B and x being defined as in any of the preceding claims, and

- reacting said metal component with anhydrous hydrogen fluoride.

7. The method according to any of claims 1 to 6, wherein the fluorinating agent is  $CH_gCl_hF_{4-g-h}$  with the sum of g+h being equivalent to 1 to 3.

8. The method according to any of the claims 1 to 6, wherein the fluorinating agent is HF.

9. The method according to any of claims 1 to 8, wherein the amorphous metal fluoride is a catalyst, preferably a heterogenous catalyst.

10. A method for the manufacture of a catalyst, preferably a catalyst comprising amorphous metal fluoride of the formula  $M^{x+}F_{x-\delta}$ ,

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,

x is any integer of 2 or 3; and

$\delta$  is 0 to 0.1,

comprising the steps of the method according to any of claims 1 to 8, wherein the amorphous metal fluoride is the catalyst.

11. An amorphous metal fluoride obtainable by a method according to any of claims 1 to 9.
12. A catalyst obtainable by a method according to claims 9 or 10.
13. A catalyst comprising amorphous metal fluoride of the formula  $M^{x+}F_{x-\delta}$ ,

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,

x is any integer of 2 or 3; and

$\delta$  is 0 to 0.1,

which is catalytically active and preferably having an active surface of about 100-300 m<sup>2</sup>/g, preferably 180-280 m<sup>2</sup>/g.

14. An industrially producible catalyst, preferably a catalyst according to claim 12 or 13, containing amorphous metal fluoride of the formula  $M^{x+}F_{x-\delta}$ .

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,

x is any integer of 2 or 3, and

$\delta$  is 0 to 0.1,

being catalytically active and preferably having an active surface of about 100-300 m<sup>2</sup>/g, preferably 180-280 m<sup>2</sup>/g.

15. A moisture resistant catalyst, preferably a catalyst according to any of claims 12 to 14, containing amorphous metal fluoride of the formula  $M^{x+}F_{x-\delta}$ .

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,

x is any integer of 2 or 3, and

$\delta$  is 0 to 0.1.

16. The catalyst according to any of claims 12 to 15, wherein M is selected from the group comprising Zn, Sn, Cu, Fe, Cr, V, Mg and Al, whereby preferably M has a charge of +2 or +3.

17. The catalyst according to any of claims 12 to 15, wherein any of M is used as  $M^{x+}F_{x-\delta}$ , as guest component or as host component.

18. A catalyst containing a metal fluoride of the formula  $M^{x+}F_{x-\delta}$ .

whereby M is selected from the group comprising metals of the second, third and fourth main group and any subgroup of the periodic table,

x is any integer of 2 or 3; and

$\delta$  is 0 to 0.1,

which catalyst is essentially free of Cl, whereby preferably the catalyst is a catalyst according to any of the preceding claims.